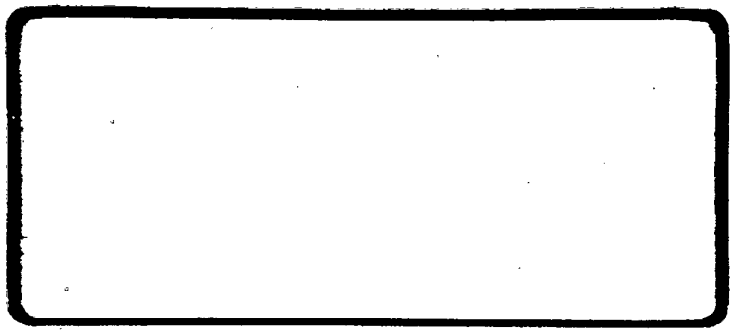
11038



STAT

STATUS REPORT

for Period

1 May through 31 May 1969

Submitted under Contract to

U. S. Government

[redacted] STAT

File No. 11038

[redacted] STAT

This document is presented as the Monthly Status Report under Contract to the U. S. Government, [redacted] STAT
The report period represented herein covers the period 1 May through 31 May 1969.

[redacted] STAT

[redacted] STAT

# INDEX

Index (cont'd.)

# APPENDICES

PROGRAM SUMMARY

| | |
|---|---|
| Scheduled Percentage of Completion | 63.0% |
| Actual Percentage this Date | 59.3% |

This report period has been highlighted by the completion of several tasks which can be considered to be major bench marks of the program.

1. [redacted] Clean Room facility has been completed and the air conditioning system is in the process of being balanced for most efficient operation. STAT

2. All electronic cabinets have been installed and interconnecting cabling is in the process of installation.

3. The control console has been positioned and attendant cabling installed.

4. The stages, air bearings and drives have been installed and aligned.

In addition, the electronic subsystems checkout is well underway and computer program checks are being run.

Also the utilities cabinet and peripheral gear is in its final assembly stage.

These accomplishments and other program efforts are covered more completely under individual Task headings.

Task 01 Statements of Work, Specifications, Report Preparation

| | |
|---|---|
| Scheduled percentage of completion | 65% |
| Actual percentage this date | 65% |

No new specifications were developed or issued during this report period.

Monthly reports from our subcontractors are incorporated into this document under appropriate task headings or in the Appendix.

Task 02 Scheduling and Planning

| | |
|---|---|
| Scheduled percentage of completion | 65% |
| Actual percentage this date | 65% |

Detailed schedules for assembly and test of mechanical and electronic subassemblies were implemented during this report period.

Detailed schedules for systems checkout and tests are now being prepared in connection with the completion of the Optical system by [redacted] STAT

Task 03 Test and Inspection Procedures

| | |
|---|---|
| Scheduled percentage of completion | 51% |
| Actual percentage this date | 45% |

Work is progressing in the development of test procedures to be implemented in the various subcontractor's plants.

It is expected that the first of these tests will be conducted at [redacted] during July 1969. STAT

Task 04 Management, Administration and Supervision

| | |
|---|---|
| Scheduled percentage of completion | 65% |
| Actual percentage this date | 65% |

Management and Administrative functions are proceeding normally with no major departures from the original Management plan.

Task 05 Meetings

| | |
|---|---|
| Scheduled percentage of completion | 65% |
| Actual percentage of completion | 65% |

During the month of May, a series of meetings was held at [redacted] with a group of customer representatives. These meetings were held for the purpose of acquainting the customer with the technical programs and achievements attained by [redacted] and to provide the Site Contractor with further information related to required environmental conditions. Task 38 provides further details of the environmental discussion.

STAT

STAT

Task 06 Facilities Requirements

| | |
|---|---|
| Scheduled percentage of completion | 98% |
| Actual percentage this date | 85% |

During this report period the Clean Room Facility at [redacted] has been activated and the air conditioning equipment is in the process of being balanced to provide proper laminar flow conditions in the room and cooling environment within the cabinets and machine. STAT

Installation of all electronic cabinets was accomplished in May and systems test and checkout is now being conducted in the area.

Task 07 Main Frame and Structural Elements

| | |
|---|---|
| Scheduled percentage of completion | 98% |
| Actual percentage this date | 93% |

The main frame for the Stereocomparator was completed in September 1968.

No additional work will be scheduled for this Task until the return of the Optical Bridge by the optics sub-contractor.

Task 08 Skin

| | |
|---|---|
| Scheduled percentage of completion | 35% |
| Actual percentage this date | 30% |

The fabrication of the external skin sections has been completed to the point where the total assembly is needed in order to finish this Task.

No further work is anticipated until the Stereocomparator has been completely assembled.

Task 09 Granite and Ways Assembly for Stage

Scheduled percentage of completion 98%

Actual percentage this date 95%

No further work is anticipated on this Task at this time.

Task 10 Air Bearings

| | |
|---|---|
| Scheduled percentage of completion | 89% |
| Actual percentage this date | 85% |

As previously reported, the air bearings were installed on both stages in February.

No further work will be scheduled until the utility cabinet is completed, at which time the bearings will be tested.

Task 11 Stage Drives

| | |
|---|---|
| Scheduled percentage of completion | 78% |
| Actual percentage this date | 65% |

Installation of the stage drive assemblies on the right and left hand stages was completed during this report period.

Testing of the assemblies will be conducted after the utilities cabinet has been completed.

Task 12 Film Drive and Transport System

| | |
|---|---|
| Scheduled percentage of completion | 60% |
| Actual completion this date | 68% |

The modified film drive and transport system is in the process of installation. Formal testing will be accomplished during the next report period.

Task 13 Film Platen and Film Clamping

| | |
|---|---|
| Scheduled percentage of completion | 90% |
| Actual percentage this date | 75% |

The platens have been scheduled for installation and test during the next report period.

Task 14 Film Cooling

| | |
|---|---|
| Scheduled percentage of completion | 70% |
| Actual percentage this date | 50% |

The utilities cabinet design has been modified to provide the additional valves and tubing required for film cooling. These valves have been ordered and will be installed during the next report period.

Tasks 16, 17 and 18 — Viewing Optics, Viewing Illumination, Reticle Projector and Illumination

| | |
|---|---|
| Scheduled percentage of completion | 75% |
| Actual percentage this date | 73% |

A monitoring trip to [redacted] was made during the week of May 26, 1969 which indicated they are making steady progress. They are preparing a revised delivery schedule which should be available by the middle of June. STAT

The anamorph system electrical sliprings have been shipped to, and received in good order by [redacted] Practically all the necessary hardware items have now been received at [redacted] The outstanding items include a few servo motors and potentiometers which are presently in use at [redacted] in connection with the servo simulation tests. STAT STAT STAT

These items are scheduled to be sent to [redacted] at the end of June. STAT

Task 20 General Platen Illumination

| | |
|---|---|
| Scheduled percentage of completion | 88% |
| Actual percentage this date | 47% |

No additional work was scheduled for this task for the month of May.

Task 21 Optical Bridge and Supports

| | |
|---|---|
| Scheduled percentage of completion | 90% |
| Actual percentage this date | 90% |

Dufing the month of May, [redacted] continued to send STAT to the optics subcontractor drawings detailing the wiring installations and connectors for their use in interfacing the optical bridge with the optics system.

A further shipment to the optical subcontractors of motors, potentiometers and related equipment will be made in mid-June. This equipment will be installed with other [redacted] furnished STAT equipment.

Task 22 Interferometer Assembly

| | |
|---|---|
| Scheduled percentage of completion | 73% |
| Actual percentage this date | 57% |

The lasers and beamsplitters have been installed on the Stereocomparator and the installation of the laser mirrors is in process. It is anticipated that interferometer checkout will be performed during the month of June.

Task 23 Optics Drive Assembly

| | |
|---|---|
| Scheduled percentage of completion | 71% |
| Actual percentage this date | 65% |

Work continued on the system aspects of the optics drives (see Task #42, Breadboards). Some modifications to the D/A - A/D converter were incorporated in order to provide compatibility with the computer logic. Tests were run on these chassis, and it appears that noise levels and drift in these systems is down to a level below one least count of the digital system (1 part in 1,024). It is therefore expected that operation of these units will be entirely satisfactory for the machine. During the month of June, the computer-controlled optics drives will be thoroughly checked.

A computer-simulation model of the automatic brightness control loop was programmed, and it was found that system operation was satisfactory in the regions of film density greater than 1.0. However, some stability problems were encountered in the region of low film density, where the system is supposed to depart from constant brightness characteristics. The design parameters require the automatic brightness control system loop to be a variable function, and it was found that for magnifications greater than about 18.0, possible instabilities could develop. Further work remains to be done on this problem but no difficulty is anticipated.

Task 24 Image Analysis System

Scheduled percentage of completion 71%

Actual percentage this date 80%

Progress on this task is detailed in [redacted] Progress Report for the period ending April 30, 1969 which is included as Appendix I. STAT

The [redacted] plant 6 was visited by three [redacted] representatives on May 23 for a routine project review. A substantial portion of the Hardware was seen in its completed form including the test fixtures and associated equipment. STAT

Various film samples were selected for the [redacted] acceptance tests which are presently scheduled for the week of July 7, 1969. STAT

Task 26 Digitizing Logic Subassembly

| | |
|---|---|
| Scheduled percentage of completion | 98% |
| Actual percentage this date | 86% |

This Task is now covered under the discussion in Task 28-Output Logic and Interfaces.

Please refer to this Task.

Task 27 Metric Readout

Scheduled percentage of completion 98%

Actual percentage this date 95%

This Task is now covered under the Output Logic and Interfaces Task 28.

Please refer to this task for progress discussion.

Task 28 Output Logic and Interface

| | |
|---|---|
| Scheduled percentage of completion | 98% |
| Actual percentage this date | 78% |

This Task now consists of the subsystems/systems tests for Tasks 26 and 27 as well as 28.

During this report period emphasis was placed on the testing of computer interface with the AD/DA converter in order to provide the tools for optics simulation tests (Task 23). At this writing, there are two more weeks of intensive work scheduled in this area.

It is anticipated that this portion of the system checkout and test will be followed by checkout of the film drive and stage drive logic.

Task 29 Cabling

| | |
|---|---|
| Scheduled percentage of completion | 98% |
| Actual percentage this date | 93% |

The primary accomplishment in this Task during the month of May was the installation of the under floor cabling to the various electronic cabinets and the interconnection of the control console with the logic in cabinet #1. The cabling to the Optical Bridge termination panels was also completed during this period.

Fifty per cent of the installed cable has been checked out and the circuitry verified in subsystems test (see task #28).

Task 30 Control Console and Chair

| | |
|---|---|
| Scheduled percentage of completion | 86% |
| Actual percentage of completion | 80% |

Check out of the pushbutton controls and console/cabinet interface continued as planned during this report period.

Installation of cabling from the central console to the distribution panel in the utilities frame behind the Stereocomparator was also started during this month.

The chair tracks were installed in the simulated computer floor and the chair placed in position.

Task 32 Computer

| | |
|---|---|
| Scheduled percentage of completion | 98% |
| Actual percentage this date | 95% |

The high-speed punch and readout interface has been installed and the computer/punch/teletype are now on line as a system.

Task 33 Electronic Racks and Control Cabinets

| | |
|---|---|
| Scheduled percentage of completion | 95% |
| Percentage completed this date | 90% |

[redacted] has completed installation of all electronic racks in the Clean Room and all chassis have been mounted in racks #1 and #3. STAT

Installation of chassis and internal cabling of rack #2 will be completed in June.

Task 34 Utilities, Vacuum and Air Systems

| | |
|---|---|
| Scheduled percentage of completion | 72% |
| Actual percentage this date | 60% |

The purchase of the new valves, tubing and connections which are required because of changes in the film cooling system has been completed and installation of these items in the utilities cabinet is progressing.

It is anticipated that the utilities hook-up will be completed during the next report period.

Task 35 Vibration Absorption and Leveling

| | |
|---|---|
| Scheduled percentage of completion | 90% |
| Actual percentage this date | 85% |

No further work is scheduled for this Task until the Optical Bridge is received from [redacted] At this time, full tests of response time and stage deflection will be conducted. STAT

This delay is necessitated by the requirement for full loading of the stages during these tests.

Task 36 Overall Assembly

| | |
|---|---|
| Scheduled percentage of completion | 50% |
| Actual percentage this date | 27% |

As the program progresses, this Task incompasses a greater bulk of the total accomplishments for a given report period. During the month of May [redacted] has: STAT

1. Installed all granite components on their respective stages.
2. Assembled and installed air bearings.
3. Assembled and installed stage drives.
4. Installed film drives and platen.
5. Installed platen illumination.
6. Completed the utilities installation behind the Stereocomparator.
7. Provided 75% of all cabling hookup.
8. Mounted lasers.
9. Installed the control console.

The peripheral equipment required for assembly is being manufactured as needed.

Task 37 Radio Frequency Noise Suppression

Scheduled percentage of completion 0%

Actual percentage this date 0%

No work was scheduled on this Task for the month of May.

Task 38 Environmental Control

| | |
|---|---|
| Scheduled percentage of completion | 78% |
| Actual percentage this date | 85% |

During this report period the sponsor's site preparation consultant met with representatives of [redacted] to discuss general installation plans and procedures. STAT

A complete review of site preparation was conducted during this meeting to ascertain whether all facilities required for operation of the Stereocomparator were provided.

Task 39 Reliability Analysis

Scheduled percentage of completion 0%

Actual percentage this date 0%

No work was scheduled on this Task for the month of May.

Task 40 Installation

Scheduled percentage of completion 0%

Actual percentage this date 15%

During the month of May, a meeting was held at [redacted] facilities with the customer's site preparation consultant and the customer to discuss installation requirements at the site for the Stereocomparator. STAT

See Task 38 for additional information.

Task 42 Breadboards and Test Devices

| | |
|---|---|
| Scheduled percentage of completion | 45% |
| Actual percentage this date | 45% |

The electromechanical breadboard models of the computer-controlled optics servos have been completed and connected to the electronics assemblies which drive and control these servos. Preliminary phasing of motors, tachometers, and feedback potentiometers has been accomplished. Measurements were taken to determine the required rate (velocity) tachometer feedback gain required, and compensation networks are being designed.

During the month of June the complete servo compensation and performance testing will be performed. Also, during this period, tests will be made of these servos with the computer tracking program in order to assure compatibility between the hardware and software portions of the machine. At the present time, it appears that all performance characteristics (such as accuracy of positioning, dynamic response characteristics, bandwidth, and stability) will be met.

Task 43 Computer Programming and Services

| | |
|---|---|
| Scheduled percentage of completion | 80% |
| Actual percentage this date | 75% |

During this report period, [redacted] has been STAT proving various portions of the computer program in preparation for the Optics simulation effort which is scheduled for June.

[redacted] progress report for the period April 1 STAT to April 30 is included as Appendix II in this report.

Task 44 Preacceptance Test in Fabrication Plant

| | |
|---|---|
| Scheduled percentage of completion | 0% |
| Actual percentage this date | 0% |

No work was scheduled for this task for the month of May.

Task 45 : Acceptance Test in Fabrication Plant

Scheduled percentage of completion 0%

Actual percentage this date 0%

No work was scheduled for this task for the month of May:

Task 46 Acceptance Test after Installation

Scheduled percentage of completion 0%

Actual percentage this date 0%

No work was scheduled on this task for the month of May.

Task 47 Instruction Manual and Drawing Submittal

Scheduled percentage of completion 28%

Actual percentage this date 20%

The revision of the design drawings to cover the "as built" status of the various subassemblies of the Stereocomparator is proceeding according to schedule.

Task 48 Spare Parts List

| | |
|---|---|
| Scheduled percentage of completion | 20% |
| Actual percentage this date | 35% |

Work is continuing on the compilation of the recommended spares for the Stereocomparator, both mechanical and electronic components.

Task 49 Operator Training

| | |
|---|---|
| Scheduled percentage of completion | 20% |
| Actual percentage this date | 68% |

Work is continuing on the Operator Training Manual which will be used in training personnel to operate the Stereocomparator.

APP. 1

PROGRESS REPORT FOR PERIOD ENDING 30 APRIL 1969

[redacted] STAT

## 1.0 Progress during Reporting Period

A rough draft on the recommended spare parts list was prepared and forwarded to [redacted] STAT

Responding to a request by [redacted] to furnish the High Voltage Connectors STAT to implement connections through an interveing [redacted] bulkhead, and STAT installation information, [redacted] purchased two of the bulkhead-mounted STAT connectors. A copy of [redacted] Industry Drawing 167-4191 was STAT forwarded to [redacted] for installation information. Two "Danger-High STAT Voltage" stickers were also forwarded for [redacted] use. STAT

The remaining outside vendor layouts of the video correlators, parallax analyzer, and channel selection logic boards were received checked and considered satisfactory.

Procurement delays on the subassembly boards and other miscellaneous system items delayed the completion of the top assemblies.

Assembly of the chassis and both image dissector assemblies was started and near completion at the end of April. Assembly of the distortion analyzer board was completed.

A temporary meter panel, required for acceptance testing, was designed, the materials purchased and its construction started. During acceptance testing the P1 connector of cable W3 (126912) plugs into a compatible connector on this panel. A short cable was also made to connect this panel with the Image Analysis System through test connector J23 on the chassis assembly. This will permit the monitoring of error voltages, when the system interface cable, W3, is tied into the [redacted] system. The load simulating resistors STAT and capacitors inside the meter panel should be disconnected when the panel is used in the last mentioned manner.

Subassembly tests were completed on the Time Base Generator, Deflection Amplifiers, Video Amplifiers, Dynode Regulator, Integrators, Sum and Difference, and Raster Delay circuitry. Operation was generally satisfactory and only minor component changes were required in a few instances to get the desired performance.

The drafting effort was reduced to adjusting outside vendor layouts to [redacted] format and to servicing change notices to update drawings with follow-up information from assembly and/or testing. STAT

Overall progress to the end of this reporting period is approximately 80%.

## 2.0 Plans for Next Period

The remaining boards should be received and assembly of all items completed.

Drawing revisions and adjustments related to assembly should be concluded.

Subassembly testing should be completed and preacceptance tests started.

# MONTHLY PROGRESS REPORT

May, 1969

This technical report is for the reporting period from April 1 to April 30, 1969. The report is prepared according to [redacted] STAT
[redacted] Specification number DB1001 (as modified). STAT

1. At the end of the month, subroutines
   a. TTIC
   b. STAGIN
   c. FID2
   d. PRESET
   e. RECR
   f. RDCRX

   were coded. With the completion of these, coding for the entire Stereoscan program was complete.

   At the turn of the month, [redacted] was documenting while STAT
   waiting for the computer to become available once again with high speed peripherals. All subroutines for the real time foreground (EXEC1 and its subordinates) were documented at month's end, with the exception of the input/output routines RDOP, RDST, and RDCR/X. Previously, all routines for the real time background were documented. The background is that portion of the program under control of TMAT.

During April, a new subroutine was created, called FID3. This routine computes the initial lens coordinates $X_{10}^{\alpha}$ and $X_{20}^{\sigma}$ from fiducial data prepared by FID1 and FID2. FID3 actually does the computations that FID2 would otherwise have done concerning these computations; it is written in FORTRAN (hence the status as a separate subroutine).

Approximately 65% of the total work has been completed as of this reporting period.

2. Next month, the documentation effort will be continued until the computer is available. At that time, checkout will be undertaken for the non-real time portion of the program (under the control of EXEC1). Subroutines subject to checkout at that time will be:

| | | Required Checkout Time |
|---|---|---|
| a. | CONVRT | 5 days |
| b. | DATAIN | 4 |
| c. | FID1 | 1 |
| d. | FID2 | 2 |
| e. | NOCAM | 2 |
| f. | PARMOD | 2 |
| g. | RECIN | 2 |
| h. | SCANER | 1 |
| i. | STAGIN | 3 |
| j. | TBSRCH | 1 |
| k. | TTIC | 1 |
| l. | TTIN | 2 |
| | Total required | 26 days |

Also at the same time, work on the above may be interrupted at [redacted] request to create a real time foreground program for actual servo checkout. The required time for this is one week. STAT

3. At the end of April, the problem of how to filter the crosstalk out of the correlator had not yet been resolved. This has a low priority because it is not really clear that crosstalk will even be a problem.

4. Work on the earth-curvature addition to TMAT, the logic to avoid partial derivative blowups, and the "no camera data" alternatives are being deferred in lieu of a possible contract renegotiation. [redacted] has written a proposal, which should be transmitted to [redacted] before the end of May. STAT STAT

5. It has been orally agreed that when the computer is again available, [redacted] will begin working second shift hours, and that [redacted] will schedule one of its personnel to work the same. STATT

6. No changes or agreements have been made requiring the contracting officer's approval.

7. No other unresolved matters are known to exist.

# ALPHABETICAL SUBPROGRAM INDEX

## General Subprogram Flow Diagram Page 8

| D | ✓ | C | Name | Page No. |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | CAMATS | 118-123 |
| | | ✓ | CONVU(X) | 44 |
| | | ✓ | CVB | 130,131 |
| | | ✓ | CVF | 132,133 |
| | | ✓ | DATAIN | 27-31 |
| | ✓ | ✓ | EXEC I | 17-19 |
| | ✓ | ✓ | EXEC 2 | 20-25 |
| | | | ~~EXINA~~ | ~~152-154~~ |
| | | | ~~EXSKS~~ | ~~155,156~~ |
| ✓ | | ✓ | FID I | 56-58 |
| ✓ | | ✓ | FID 2 | 59-62 |
| ✓ | ✓ | ✓ | FID3 | |
| | | ✓ | FIXR | 157,158 |
| ✓ | ✓ | ✓ | GTP | 80-82 |
| | | ✓ | LSTC/PSET | 145,146 |
| ✓ | ✓ | ✓ | MATMAK | 127-129 |
| | | ✓ | MSGIN | 147,148 |
| | | ✓ | MSGOUT | 149-151 |
| ✓ | ✓ | ✓ | MTS | 100-104 |
| | | ✓ | NOCAM | 41-43 |
| | | ✓ | PARMOD | 32-35 |
| | | | PRESET | |
| | | ✓ | MSGIN | |
| | | ✓ | MSGOUT | |

| D | ✓ | C | Name | Page No. |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | PTOP | 105-111 |
| | | ✓ | RDOP | 140-142 |
| ✓ | | ✓ | RDST | 143,144 |
| | | ✓ | RECALL | 66-68 |
| | | ✓ | RECIN | 45,46 |
| ✓ | ✓ | ✓ | REORT | 83-88 |
| | | ✓ | SCANER | 39,40 |
| ✓ | | ✓ | STAGIN | 49-55 |
| | | ✓ | TBSRCH | 36-38 |
| ✓ | | ✓ | TICT | 134-136 |
| ✓ | | ✓ | TICX | 137-139 |
| ✓ | ✓ | ✓ | TMAT | 89-99 |
| ✓ | ✓ | ✓ | TRK | 69-79 |
| ✓ | | ✓ | TTIC | 63-65 |
| ✓ | | ✓ | TTIN | 47,48 |
| ✓ | | ✓ | T 2 PAN | 112-115 |
| ✓ | | ✓ | T2STRP | |
| ✓ | ✓ | ✓ | XMX I | 124-126 |
| ✓ | ✓ | ✓ | XAI | |
| ✓ | ✓ | ✓ | YMR | 116,117 |
| | | ✓ | RDCR/X | |

C = coded
✓ = code-checked
D = documented